Collection5 MODIS Terrestrial GPP and NPP (MOD17)

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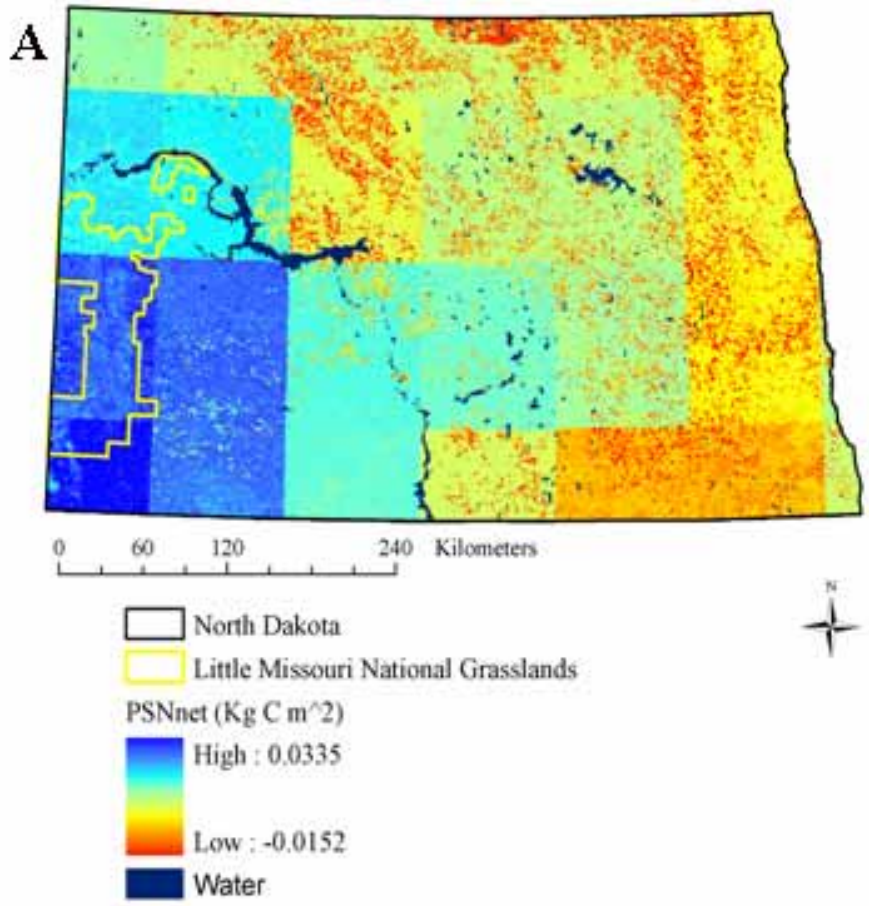
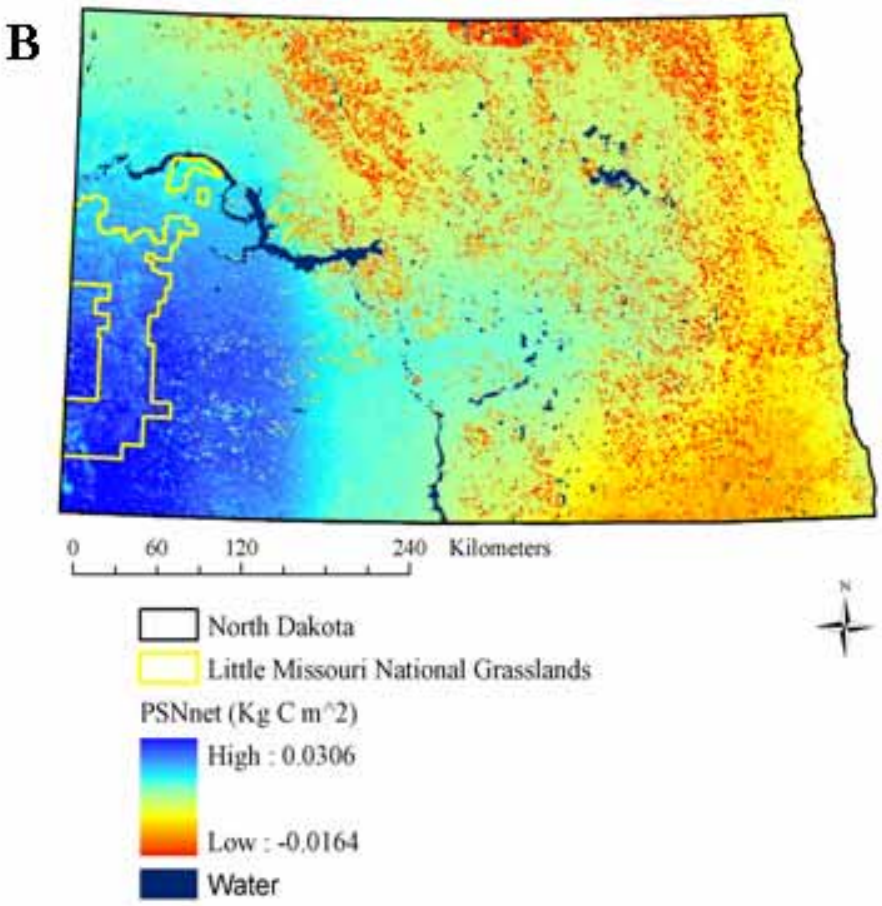
Improvements from Collection 4 to Collection 5

- Algorithm refinements
  - $Q_{10} = 2.0 \longrightarrow Q_{10} = 3.22 - 0.046*T_{avg}$
  - $R_g = f(LAI_{max}) \longrightarrow R_g = 0.25*NPP$
  - Updated BPLUT

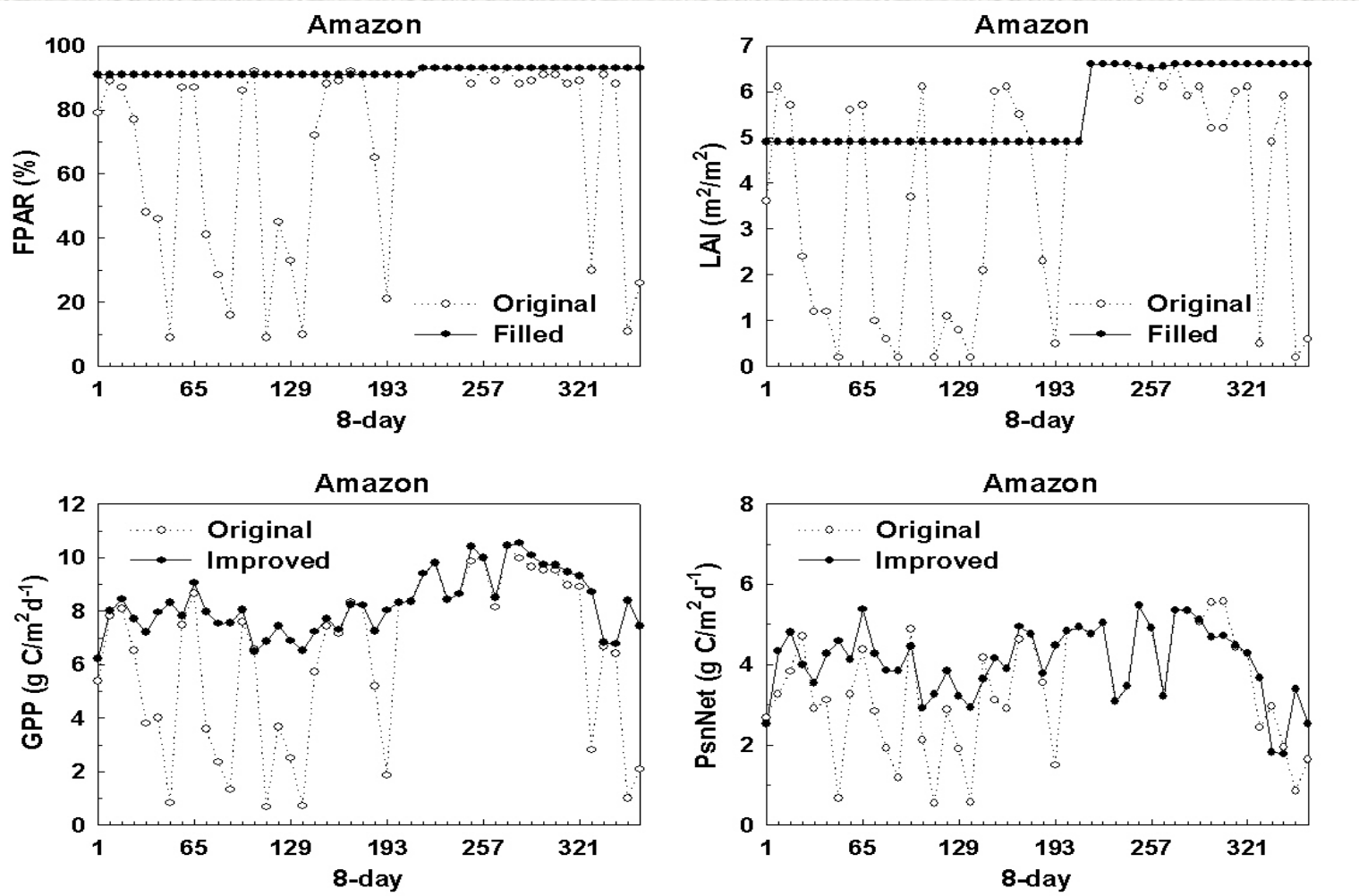
- Data input improvements
  - Spatial interpolation of GMAO/NASA (meteorology data)
  - Temporal filling of missing and cloud-contaminated MODIS FPAR/LAI (Collection 4)

Spatial Interpolation of GMAO



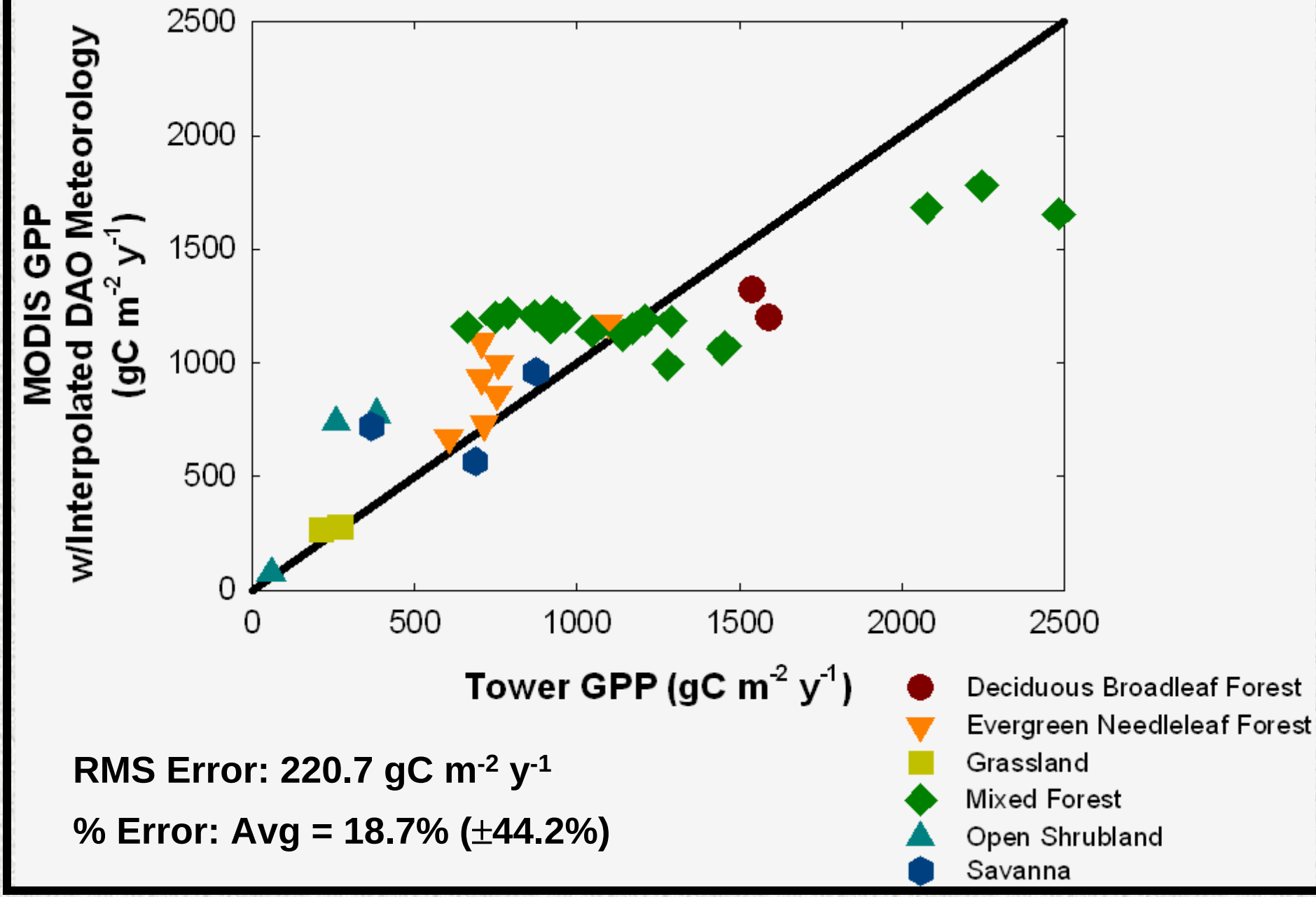


Temporal Filling of Unreliable FPAR/LAI (Amazon Rain Forest)



- Original GPP = 2252 g C/m^2y^{-1}, NPP = 871 g C/m^2y^{-1}
- Improved GPP = 2759 g C/m^2y^{-1}, NPP = 914 g C/m^2y^{-1}

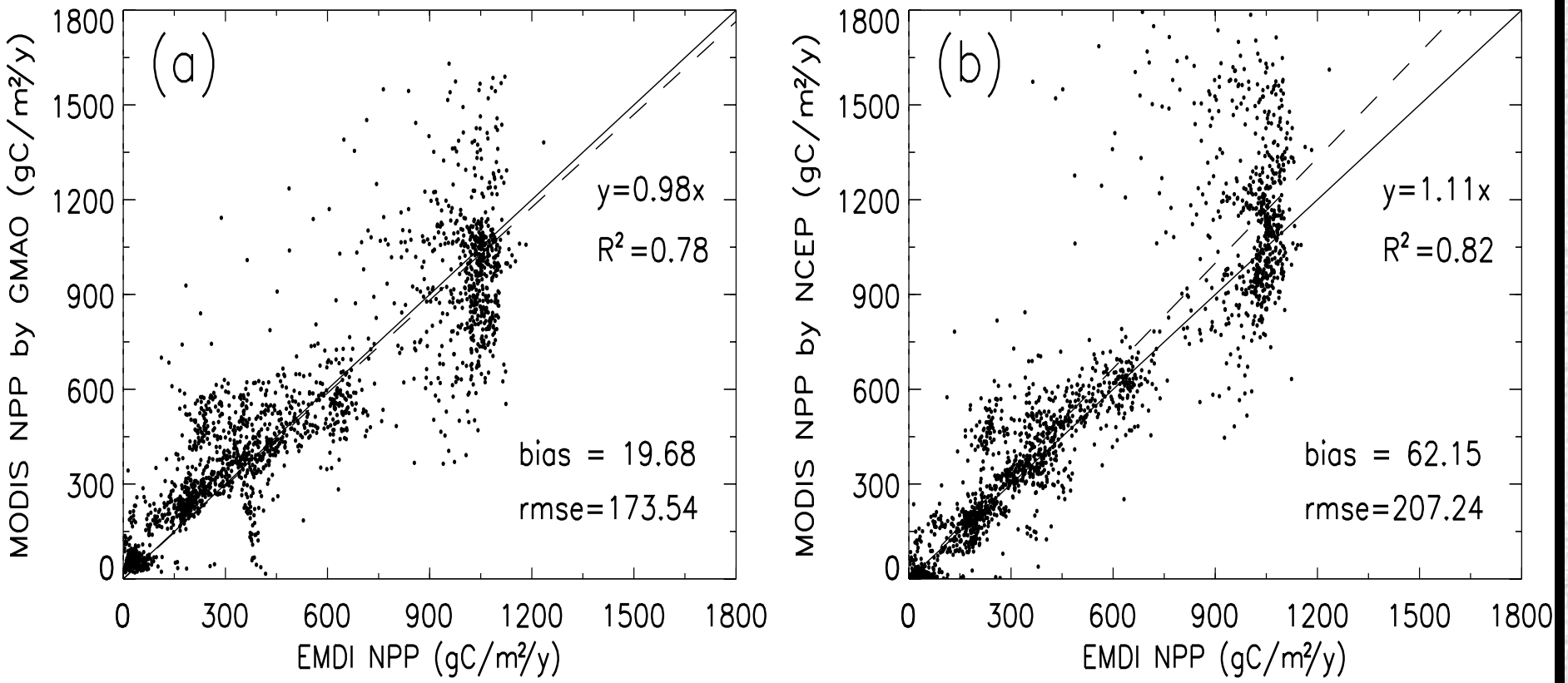
Validation of Annual GPP at AmeriFlux



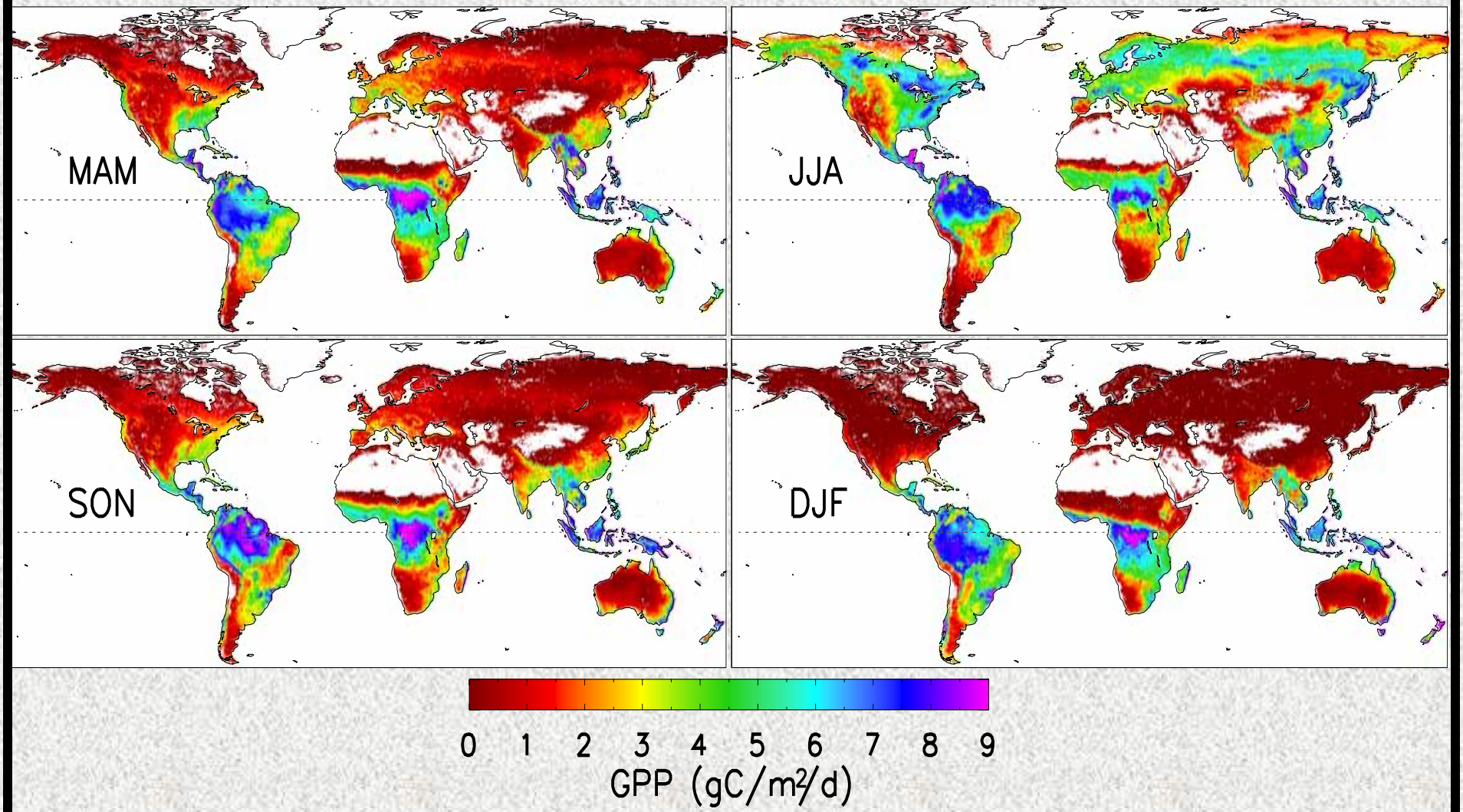
RMS Error: 220.7 gC m^{-2} y^{-1}

% Error: Avg = 18.7% (±44.2%)

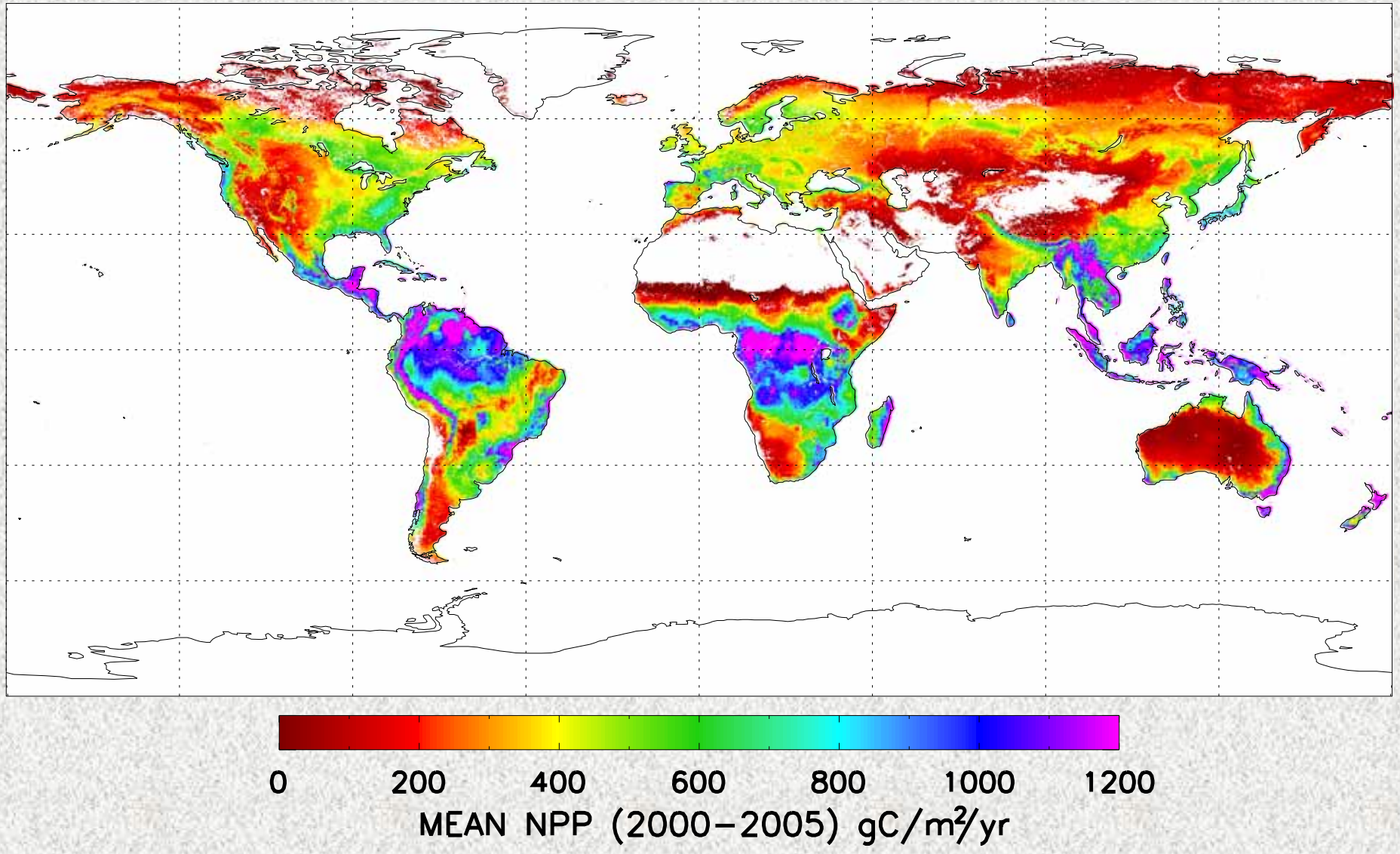
Validation of Annual NPP



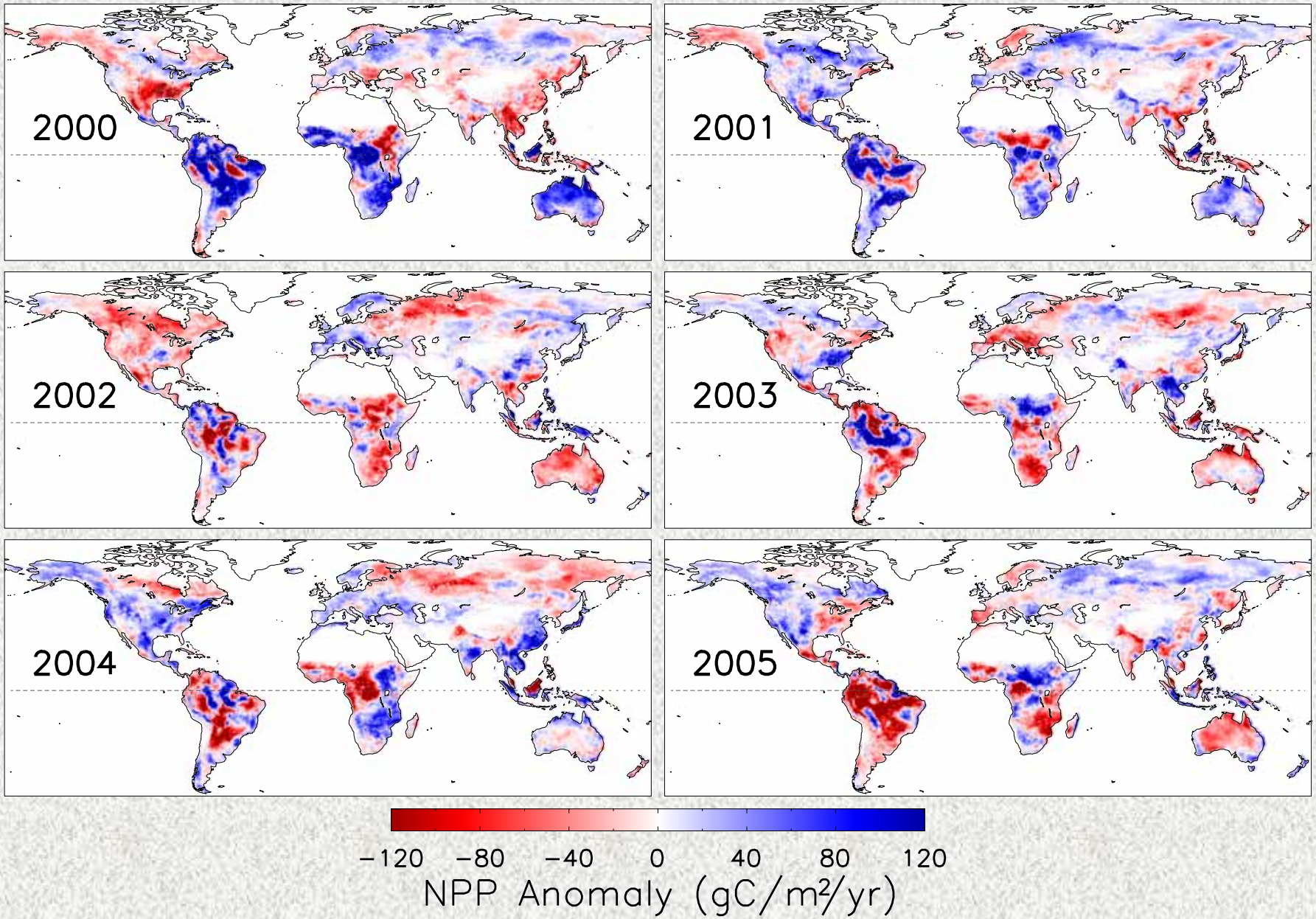
MODIS GPP Seasonality (Spatial)



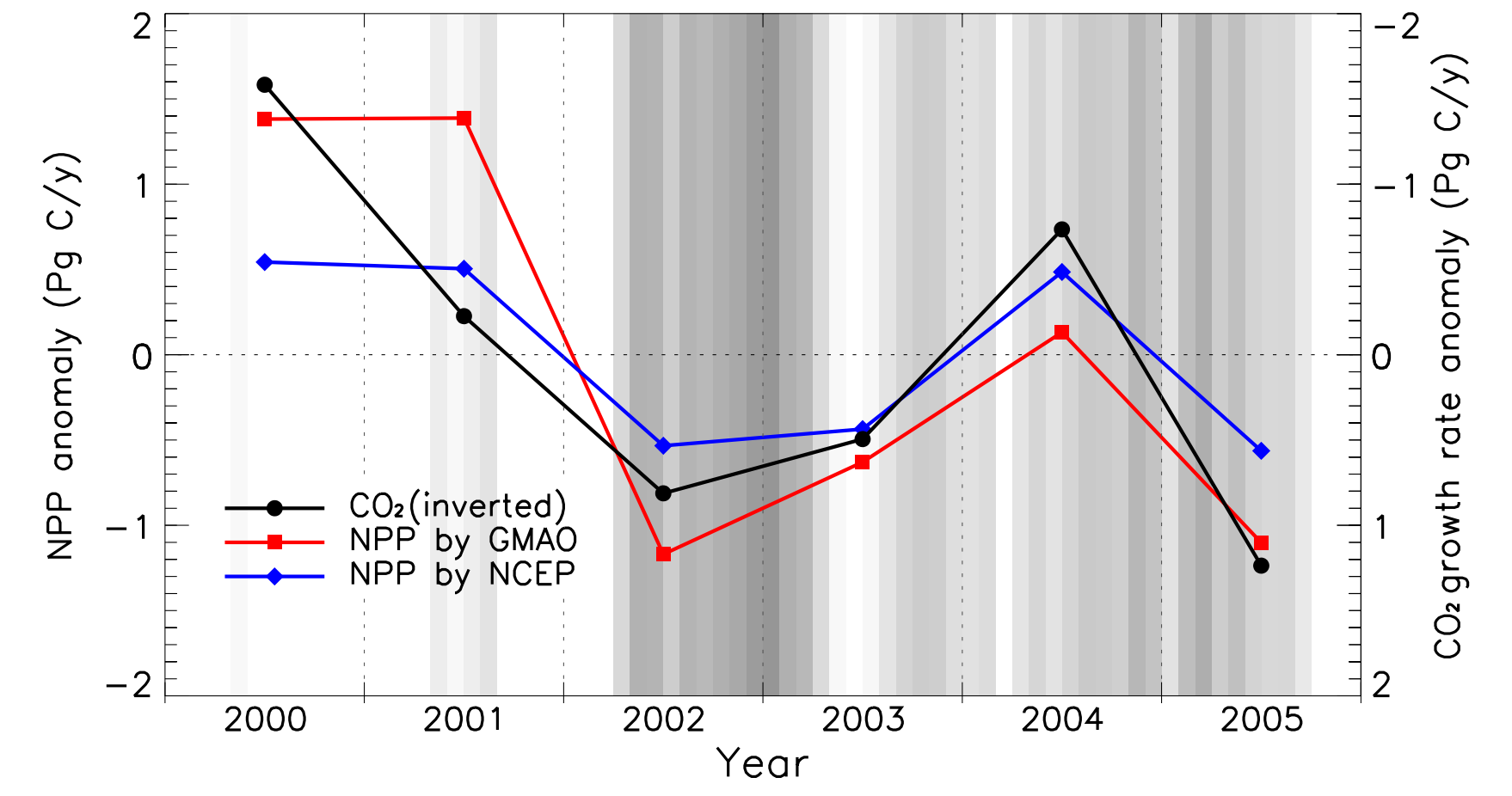
Mean Annual NPP (2000 ~ 2005)



Inter-annual Anomalies of MODIS NPP (Spatial)



Inter-annual Anomalies of MODIS Global NPP

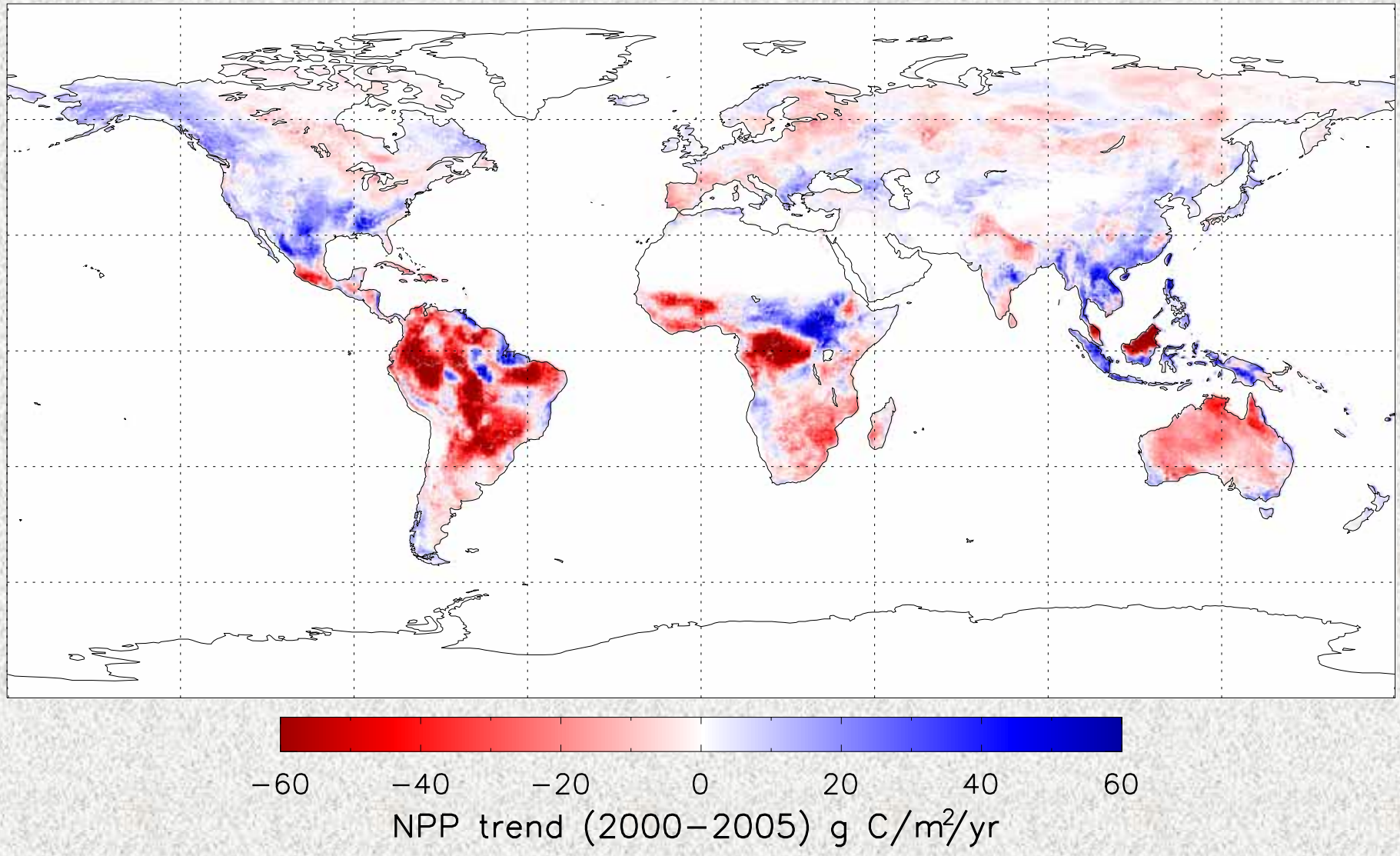


Correlation between NPP and inverted CO_2 growth rate

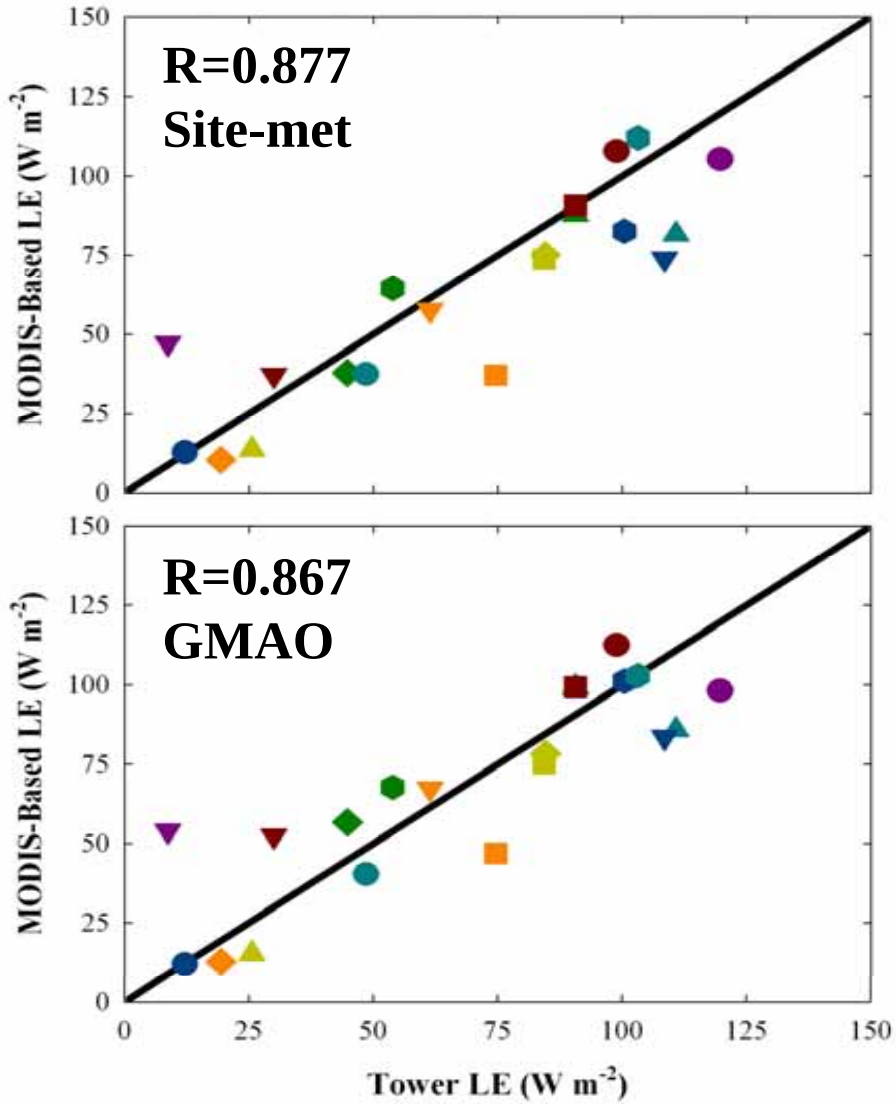
NPP by GMAO R = 0.85 2000~2005 $p < 0.016$

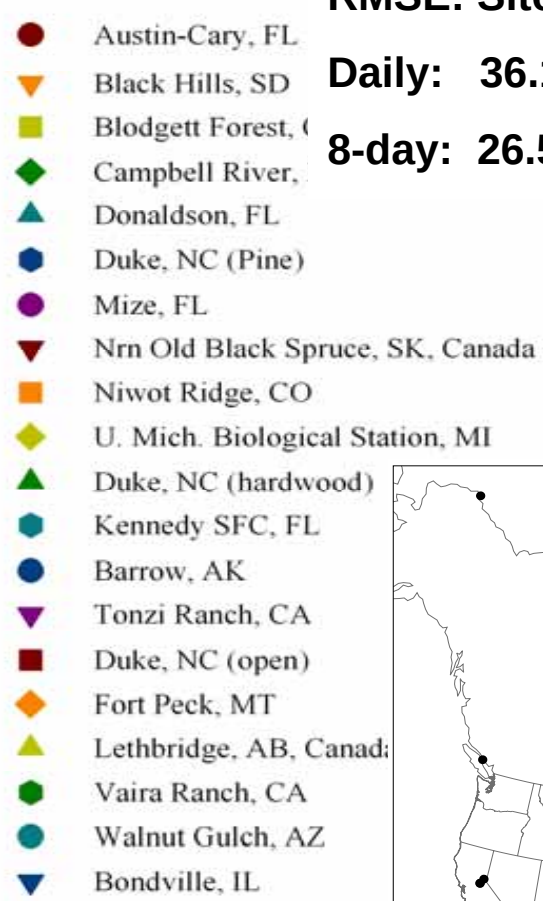
NPP by NCEP R = 0.91 2000~2005 $p < 0.006$

Linear Trend in the Global NPP (2000~2005)

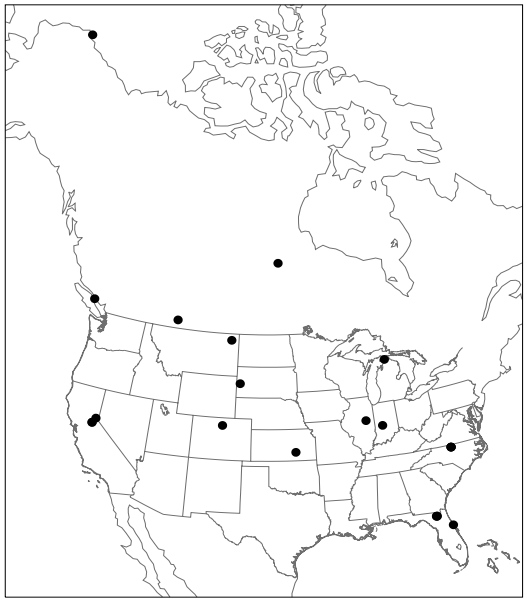


MODIS Evapotranspiration Validation at AmeriFlux



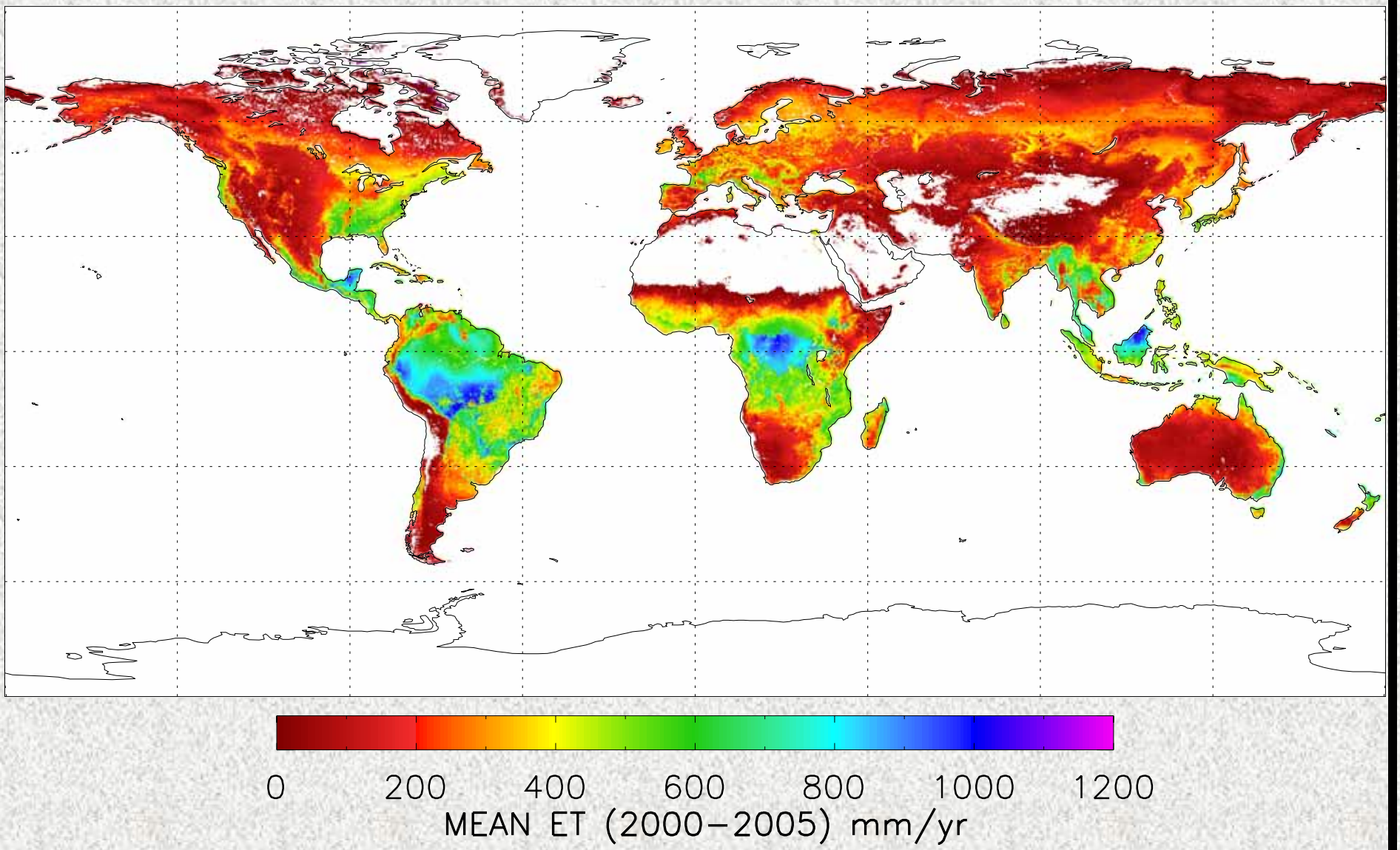


RMSE:	Site-met	GMAO
Daily:	36.1W/m^2	38.5W/m^2
8-day:	26.5W/m^2	28.8W/m^2



(*Mu et al. 2007, RSE, in revision*)

MODIS Global Evapotranspiration (2000~2005)



(*Mu et al. 2007, RSE, in revision*)

Thanks!

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